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USSR SUGAR

TODAY AND TOMORROW

United States Department of Agriculture

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Preface

This publication focuses on the economic and institutional features of the Soviet sugar industry. It is based on a trip to the Soviet Union in October 1977 by a United States Department of Agriculture Sugar Beet and Sugar Team. The trip was taken under the U.S.-USSR agreement for exchange of information, and was the first visit of an economic sugar team from the United States to the Soviet Union. The members of the team were Leslie C. Hurt team leader, Foreign Agricultural Service; Robert D. Barry, Economics, Statistics, and Cooperatives Service; (formerly Economic Research Service) and John S. McFarlane, Science and Education Administration–Federal Research (formerly Agricultural Research Service).

The trip was made during the period October 10-28, 1977. The itinerary included Moscow, Kiev, Voronezh, Kishinev, Krasnodar, and producing areas in the Ukraine, Russian Soviet Federated Socialist Republic (RSFSR), Moldavia, and Kazakhstan. Meetings were held with officials of the Ministry of Agriculture, Ministry of Food and Industry, and Prodintorg (the State Trading Organization). Various collective and state farms and processing plants were visited.

It should be noted that the estimates of production were made by the team at the time of its visit. Conditions and estimates may have changed by the time of publication.

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USSR SUGAR–TODAY AND TOMORROW

By Leslie C. Hurt, Robert D. Barry & John S. McFarlane
Sugar and Tropical Products
Foreign Commodity Analysis

Summary

The USSR is the world's leading producer of sugar. The 3.7 million hectares devoted to sugar beets each year usually produce about 9 million tons of sugar. Nevertheless, not enough is produced for self-sufficiency. Imports are primarily from Cuba, but in 1977 over 600,000 tons were imported from the Philippines. Exports of sugar have been small, around 100,000 tons, in the past few years.

About half of Soviet production is in the Ukraine, which has 178 of the country's 320 sugar mills. Most of the remainder of the production is in the Russian Soviet Federated Socialist Republic (RSFSR), Moldavia, and Kazakhstan. Both yields and sugar content are fairly low. The shortness of the growing season, chronic weed problems, lack of moisture, and technical difficulties have kept production at a lower level than otherwise could have been realized.

The USSR is taking steps to improve its sugar industry. Processing plant efficiency is expected to be increased by reducing the processing season from the current 130 to 116 days. There are 23 departments and laboratories working on improving the sugar beet itself. More of the monogerm variety is being planted, and it now accounts for about 75 percent of all seed used. Mechanization is being increased and there will be some expansion of irrigated area.

Prospects for sugar in the next few years are for steady improvement. While Soviet imports will continue, there will be less dependence on foreign supplies in the future. Improved output is being encouraged, and producer incentives are being made in increasing amounts. These are in the form of bonuses for over-fulfillment of plan, early marketing, and for sugar content. Total acreage is not likely to change much, but yields and sugar content both will probably be improved in the future.

Sugar Beet Production

The sugar beet harvest was nearing completion at the time of this visit. Harvest had been started about September 1 and had proceeded on schedule in most areas. The weather had been dry in nearly all regions, and the beets were relatively clean when delivered to the sugar plants. Some frost had occurred, but damage to the beets had been minor. The beet yields were good, but were not expected to equal the 26.3 tons per hectare yield obtained in 1976. Losses both in the field and at the sugar plants will be lower than in 1976. Unless unusually adverse weather conditions occur during storage, the volume of beets processed should be substantially higher than in 1976.

Sucrose percentage varied greatly from one region to another, but the Ministry of Foods forecast a 16.5 percent average for the entire country. This is a little lower than normal and is caused in part by early harvest to avoid possible losses from severe freezing in October.

The season was too advanced to permit an accurate appraisal of the disease situation. The fields observed were relatively free of disease, but we were told that Cercospora leaf spot caused losses in the North Caucasus region and in the eastern Ukraine. Virus yellows is becoming more of a problem in the western production areas. Sugar beet nematode is regarded as a minor problem. The long, cold winters and the long rotations practiced in most areas undoubtedly help keep the nematode population low.

Fertilizer usage is increasing and this tends to favor higher yields. The team was questioned about the effect of nitrogen fertilization on sucrose percentage and there was some indication that an excess of nitrogen was occasionally applied. Only 150,000 hectares of sugar beets are irrigated. The irrigated area is being expanded but most of this land will be used for other crops.

Farm laborers dislike the hand labor associated with sugar beet thinning, hoeing, and topping. Progress is being made in completely mechanizing sugar beet production. To minimize labor requirements at thinning time, the use of monogerm seed is slowly being expanded. In 1972, 60 percent of the crop was

reportedly planted with monogerm seed and this has been increased to a reported 70 percent. The use of herbicides is expanding.

Recently the Soviets have developed a six-row self-propelled sugar beet harvester known as the RKS-6. The machine was doing an excellent job in the field we observed. Frequently the beets were being harvested more rapidly than they could be hauled to the sugar plant, and it was necessary to pile a portion of the beets on the farm. Machines had been developed to load these farm-piled beets into trucks. Sugar beet tops are removed mechanically in advance of root harvest and are used for livestock feed.

Because of the cold Russian climate sugar beets must be stored for a long time. Beet storage begins about September 15 in most areas. Harvest is completed in later October or early November and sugar plants frequently process stored beets until early January or later. This means that the storage period often lasts for 110-125 days.

Losses during storage are a cause of great concern. A portion of the piles are ventilated and a covering of reed mats is frequently used to reduce freezing. Research is under way to develop sugar beet varieties with better storage properties and to develop better storage procedures. Sugar plants are being enlarged so that the storage period can be reduced to 90-100 days.

Industry Structure

General Institutional Setting

The Soviet sugar industry is part of a centrally planned economic system. Major decisions with respect to production, utilization, and trade are made by administrative fiat. However, under Brezhnev, material incentives increasingly have been used to stimulate production and efficient operations.

Interindustry and interlocational balances of material inputs and outputs are established at the direction of GOSPLAN, the State Planning Agency. Adjustment of supplies by the free play of market forces is very limited, being confined almost entirely to the production and marketing of goods from private plots that constitute a small portion of total arable land. In the case of sugar, an industrial crop, no private or free market exists, although economic incentives play a major role in production planning.

Cultural Methods

Kolkhoz and Sovkhoz. About 90 percent of sugar beet output comes from kolkhozes (collective farms); the rest are produced in sovkhozes (State farms). A kolkhoz is a cooperative organization of farm families with perpetual rights to rent-free land owned by the State. Sovkhozes are State-run enterprises that are rural equivalents of urban industries. Workers are State employees and their wages are paid from State funds.

Typically, there are some 400-500 families in a kolkhoz, clustered in several villages. Around the villages are communally owned fields. Between 1958 and 1976 the number of kolkhozes in the USSR declined nearly 60 percent to 27,700 as a result of conversions to sovkhozes and a continued trend toward consolidation of smaller kolkhozes. However, as of 1976, the average size of a kolkhoz (3,700 hectares) was still only 2/3 that of a sovkhoz.

The number of sovkhozes increased more than 200 percent. By 1976 cultivated area under State farms had reached over 118 million hectares compared with about 101 million hectares under collective farms.

When the Soviets were asked whether kolkhozes were viewed as a transitional form, the USDA team was informed that there was no longer a trend to convert kolkhozes into sovkhozes, and that one was as efficient as the other. The numbers had been determined by "historical pattern" and were now "stabilized." Since 1967 the kolkhozes have been required to follow the sovkhoz practice of paying monthly cash wages.

The team was informed in Kiev that capitalization was greater for sovkhozes and that, with a higher capital-labor ratio, the productivity of labor (output per unit labor) was above that for kolkhozes. In the future, kolkhoz capitalization was to be intensified, but there were no plans for further conversion into sovkhozes. The team was told also that sovkhozes were no more specialized than kolkhozes in terms of crops.

At Tschors Kolkhoz (Ukraine) it was said that the number kolkhozes was to be reduced a third through a process of "solidification," which does not seem to be the plan for other areas. In Moldavia the size of sovkhozes ranged from 2,000 to 5,000 hectares. In Krasnodar Krai the average kolkhoz size was 8,000-9,000 hectares.

Kolkhozes in need can hire or borrow resources from other kolkhozes. Payment is in standard wages or an IOU. But there is no payment for machinery use, only for labor help. Inter-kolkhoz cooperation is informal, a "good neighbor" arrangement. However, more formal inter-kolkhoz, inter-sovkhoz, and kolkhoz-sovkhoz associations are increasing in number. These pool resources for specialized functions such as beef feeding. None exist for sugar beet production, although as part of a program of "specialization and concentration" (see next section), there is an effort to integrate

sugar beet operations more closely with sugar processing plants and with livestock farms (as the cattle fatten on factory waste and byproducts). "Agro-industrial associations" have been organized for this purpose.

Two large agro-industrial complexes, centered on sugar processing facilities, are being designed and one of these is being built in the south Ukraine, an extension of an existing plant.

Production Management. The State production plan for sugar beets is established in terms of five production zones. These are areas of (1) Sufficient moisture, (2) Unstable moisture, varying year-to-year, (3) Insufficient moisture, (4) Irrigated (South Ukraine, Kirghiz, Kazakhstan, and (5) Unstable in moisture and temperature (North Caucasus).

Under a program of "specialization and concentration," sugar beet plantings are being concentrated in areas of sufficient moisture. In these areas the Soviets are aiming at greater farm specialization, with close to 30 percent of arable farm areas being planted in sugar beets. More than 30 percent specialization in sugar beets is deemed undesirable because of problems with nematodes, disease (such as root rot), and weeds. In dry areas, perhaps only 10 percent of the farm area would be in sugar beets.

Sugar beets are planted in rotation and in competition with winter wheat, peas, barley, and sunflower. In Tschors Kolkhoz (Ukraine) there is a 10-field system of crop rotation and, presently, 2 1/2 fields are allocated to sugar beets. At Ramon (Voronezh, RSFSR), the team was told that the typical crop rotation is 55-60 percent grain, 15-20 percent sugar beet, 20-22 percent rootcrops; and 10-11 percent sunflowers. Corn is grown for silage; perennial annual grasses may also be grown. In Moldavia, the sugar beet area could be increased 25-30 percent, if land were taken from sunflowers and tobacco. However, this does not appear likely.

In both Ramon (Voronezh) and Tschors (Ukraine), the practice was to plow deep, some 20-30 centimeters (cm). Fertilizer was in sufficient supply and came directly to the farms from State chemical plants.

Harvesting is now completely mechanized, although manual harvesting takes place if there is heavy rain or frost when field machinery does not work well. In 1976, when frost occurred in October, the soil was frozen down 15-16 cm and manual harvesting was required. At Tschors (Ukraine), harvest was at a rate of 25 hectares a day. Two models of 6-row harvesting combines were used; 2 and 3-row combines were also employed. We saw a 6-row harvester at work and it was impressive; two women were trailing the harvester but there did not seem to be much left over for them to dig and pick up. The beets that were mechanically picked up were very clean.

The Soviets use a "two-pass" system: a harvester first cuts the beet tops; then the beets are pulled out on the second pass. The tops are loaded into tractor trailers and used as silage for cattle feed. The harvesting combines appeared efficient and superior models; continued efforts are aimed at more efficient cutting of tops, digging of roots, and minimizing labor used for cleaning the beets.

In the Voronezh area labor time per centner (100 kilograms, kg) of sugar beet produced came to an average of nearly 60 minutes, but some farms registered higher labor productivity at 25 minutes a centner, and a few even at 15 minutes a centner. At Sickle and Hammer kolkhoz (35 miles from the city of Voronezh) labor productivity was 48 minutes a centner, of sugar beet; at the large Kubanj kolkhoz in Krasnodar, productivity in 1977 had been improved over the 1976 figure of 36 minutes a centner.

Irrigation. According to the 10th Five-Year Plan (1976-1980), the USSR's irrigated, arable area is to be increased to 4.2 million hectares by 1980.

Of this area, an additional 91,000 hectares will be irrigated for sugar beets by that time, bringing the total to at least 241,000 hectares—about 60 percent above the current sugar beet area under irrigation of 150,000 hectares. Currently 50,000 hectares of sugar beet area are irrigated in Kirghiz, 17,000 in Kazakhstan, and 10,000 in Moldavia. The South Ukraine and Volga areas are targeted for expanded irrigation and by 1982, the Ramon area (Voronezh) will have 1,500 hectares more irrigated sugar beet area than in 1977.

A large irrigation system is under construction in Moldavia. Total area under irrigation is supposed to rise to 160,000 hectares by 1980, of which 32,000 would be used for sugar beets by 1980, and 50,000 by 1985.

The total USSR sugar beet irrigated area of 150,000 hectares may be an underestimate; a published source indicates 180,000 hectares is the current total.

The Price System

Almost 100 percent of sugar beet production is purchased by the State, as is the case with industrial crops generally. Delivery quotas or procurements for sugar beets are established by GOSPLAN, the State planning organ. The Ministry of Procurement organizes the Government acquisition of agricultural materials, oversees fulfillment of procurement plans, and coordinates the work of other ministries and departments that purchase sugar products.

Procurement prices for sugar beets are fixed and guaranteed for each 5- year-plan (FYP) period, but vary depending on location. A regional system of Government procurement prices has been established whereby farms in areas with superior natural conditions for growing sugar beets receive lower prices than farms in less favorable regions. The objective is obstensibly to maximize total overall agricultural output (including other crops) by making farming in one region as "profitable" as farming in another. The efficiency of this system, at least in terms of production costs, is questionable, as the scheme works against the principle of comparative advantage. Perhaps some covert overriding factors (such as a strategic need for more extensive or diversified regional development) provide the true rationale.

For sugar beet production, the pricing system means that purchase prices are lowest in the Ukraine and Volga regions where soil and other natural conditions are especially favorable to sugar beet production.

There are six purchase price zones, but some have subzones. Price differentials among subzones are about 10 rubles/metric ton ($13.50/metric ton). The average purchase price for sugar beets in the USSR is 30-48 rubles/metric tons ($40-67/metric tons). The largest price zones in terms of area are in Altai (Kirghiz) and Kazakhstan.

At Kiev, we were informed there were only four purchase price zones. At Sickle and Hammer Kolkhoz (Voronezh), the purchase price was 34 rubles/metric tons ($45.90/metric tons); at the Salivonkovsk plant (Ukraine) 31.50 rubles/metric tons; in Moldavia, 30 rubles/metric tons; and at Ust Labinask (Krasnodar) 39 rubles/metric tons ($52.65/metric tons).

At Labinsky sovkhoz (Krasnodar) sugar beet seed is purchased by the State at 650-1000 rubles/metric tons. ($877-1,350/metric tons).

Wholesale prices are established by the Committee on Prices of the Council of Ministers, working closely with the Ministry of Finance. The Ministry of Trade administers sugar sales. There are three "price belts:" Ukraine; Moscow and Central USSR; and the rest of the USSR. Retail prices are about 78 kopeks a kilogram (48 cents a pound) in the Ukraine and about 80 percent higher for cubed sugar; 90 kopeks (55 cents) in Moscow; and higher in the "third belt."

Prices were last revised across-the-board for sugar beets and sugar in 1972; wholesale prices have since been revised, but not retail.

Although purchase prices are fixed, economic incentives are provided to encourage production:

- Tonnages delivered in excess of procurement quotas are paid at prices 50 percent above the established purchase price. For example, if the procurement price were 35 rubles/metric ton, above-quota deliveries would be paid at 52.5 rubles/metric ton.
- To help ensure completion of the sugar beet harvest before weather changes late in the year raise havoc with harvesting, a bonus is paid for fulfillment of intermediate procurement quotas that are set for September 15. The bonus is about 20 percent of the price that would apply to deliveries after September 15. For example, if the delivery price were 30 rubles/metric tons, fulfillment of the September 15 quota would mean a bonus of about 5 rubles/metric ton for a total 35 rubles/metric ton.

There is a disadvantage in early harvesting: Sucrose content is not as high as it would be with longer maturation of the beet and thus, too much harvested too soon could mean a lower quantity of sugar recovered. Further, with weather still warm, the accumulation and open-air storage of beets for more than 3-5 days would create problems of spoilage and decline of sucrose content. The "balance" among these factors is worked out to some semblance of optimality by the establishment of the September 15 quotas and the requirement that beets should not accumulate more than can be processed in 3-5 days. The September 15 bonus is thus for the right quantity, not much more, nor less than the quota.

- A bonus is paid to the enterprise for superior beet sucrose content. One extra ruble per ton is paid for each 1-percent improvement in sucrose content over the immediately previous regional 5-year average. No penalty is imposed if sucrose content is below the average but such a refinement may be adopted in the future.

The bonus system for sucrose content was begun in 1975 with 12 processing plants in the Ukraine. Of the USSR's 320 processing plants, 276 are now paying bonuses for sucrose content, including all 187 plants in the Ukraine, and many in the RSFSR, Moldavia, Kirghiz, and Kazakhstan that started with the program in 1977. In the near future all plants will be paying the bonus.

- Sugar beet farms are provided beet pulp at a rate of 50 percent of the weight of sugar beets delivered by the farm. At the Gindeshtsky plant (Moldavia) 80 percent of the beet pulp went back to the farms,[1] and farms additionally obtained 50 percent of the molasses byproduct of sugar

[1] As every 1,000 metric tons of sugar beets yields 800 metric tons of pulp, the free pulp returned to the farms would be only 500 metric tons (e.g., one-half of weight of beets delivered). Between 500 and 800 metric tons is approximately 60 percent of the total pulp and so the difference must have been purchased. The purchase price at Gindeshtsky was 47 rubles/metric tons ($63.45/metric tons).

processing plants, prorated according to sugar beet deliveries. At the Sickle and Hammer kolkhoz, the molasses allotment was expressed differently, as the weight equivalent to 1 percent of the delivered weight of beets.

• Individual workers are eligible for various bonuses or premiums supplemental to standard wages. The kolkhoz bonus system is recommended by the State; for sovkhozes, it is a directive. In practice, there is little difference, as the kolkhoz follows recommendations closely. Payment for a particular service is, in principle, the same for kolkhoz and sovkhoz workers. Wages are determined by the Committee on Labor and Wages of the Council of Ministers, and vary by area and kind of work.

For both kolkhoz and sovkhoz, sugar is made available to workers at a preferred (low) price, at a rate of 1/2 kilogram per metric ton of beets delivered. This would be in addition to amounts given free, at a rate of 5 kilograms per metric ton of beets delivered per kolkhoz worker, and at a rate of 2 1/2 kilograms for sovkhoz workers. This fringe benefit was expressed differently in Voronezh where each farm family, depending on work done, received sugar up to a maximum of 1 metric ton; the surplus above consumption may be sold to the State at the retail price.

Processing

Sugar industry plants are administered by the Ministry of Food Industry. The plants receive, store, and process sugar beets into sugar, pack the sugar and deliver the sugar to storage depots. Upon delivery, the plant receives payment from the Ministry of Trade. The Ministry of Food Industry is responsible for building, reconstructing, and enlarging sugar manufacturing plants.

The USSR's sugar processing capacity per day in 1977 averaged 739,000 metric tons from 319 plants. The 320th plant being built in Moldavia, with a daily processing capacity (DPC) of 3,000 metric tons, was almost completed. The daily processing capacity per plant within the USSR would then average over 2,000 metric tons.

By 1980, processing plants are expected to number 330, and total DPC would reach 867,000 metric tons. This would mean a DPC average per plant of 2,627 metric tons in 1980, an increase of 13 percent over that of 1977. By 1980, there are scheduled to be eight processing plants, each with a DPC of 6,000 metric tons. The largest plant in the USSR is the Lofisky plant in Poltava (200 kilometers south of Kiev), with a DPC of 9,000 metric tons. The largest plants are located in the Ukraine.

According to the Ministry of Food Industry, only one plant, located in Odessa (the Black Sea coast) refines raw cane sugar exclusively. The plant has a DPC of about 600 metric tons. At Prodintorg (the foreign trade agency, in Moscow) it was pointed out, however, that a plant in Vladivostok (Far East USSR) also refines raw cane exclusively.

Other areas where raw cane sugar is milled are the Baltic and Krasnodar Krai. In Moldavia, some 100,000 metric tons of Cuban raw sugar is refined annually, and as much as 200,000-250,000 metric tons can be accommodated with the present facilities. Of 187 plants in the Ukraine, some 30 process raw cane sugar; these plants have DPCs ranging from 1,100 to 7,500 metric tons. In 2 years, the minimum DPC will be up to 2,000 metric tons, as 47 plants are being reconstructed. Of the processing plants visited by the USDA team, the Salivonkovsk (Ukraine) mill had the highest DPC at 5,000 metric tons. In Moldavia, total DPC is 22,000 metric tons with DPCs ranging from 800 to 2,700 for the individual plants. The Gindeshtsky mill (Moldavia) has a DPC of 2,000 metric tons and is being enlarged to reach 4,000 metric tons by 1980. The Ust Labinsk plant in Krasnodar Krai, with a DPC of close to 5,000 metric tons, is to be expanded to achieve 6,000 metric tons by 1980. Ust Labinsk occasionally refines raw cane sugar. Currently, there are 17 sugar processing plants in Krasnodar Krai.

The USSR's processing capacity is being increased to accommodate a planned greater volume of sugar beet output and to reduce the length of the processing season. Currently, the Soviet processing season extends about 130 days (1971-75 average). Under the 10th Five Year Plan, the season is to be cut to 116 days by 1980/81. In Altai (Kirghiz) and some other areas where the temperatures are low, plants work 180-200 days as the cool climate retards beet spoilage.

In the southern USSR, some plants are aiming at 100-110 days, and at Ust Labinsk, the goal is to reduce the season's length from 125-130 days to 90-95 days.

The "economics" of shortening the processing period seem at least questionable. With the high capital investment required for sugar processing plants, the tendency in the U.S. is to spread plant utilization over a longer period. However, an important factor in comparing Soviet with U.S. practice is the relative cost of storage of beets and beet loss of sucrose content and technical processing properties.

The Soviets contend that the increased processing capacity of sugar plants is not causing a

lengthier radius of delivery of beets from farm to plant.[1] On the contrary, they say that the tendency is toward shortened distance of delivery, as a result of an increase in the number of plants and the program of Specialization and Concentration (see page 3).

In the places visited, the farthest distance of delivery was in Beltsy (Moldavia) at 50 kilometers. The Salivonkovsk plant (Ukraine) had a maximum radius of 40 kilometers, but for the Ukraine the average distance of farm to intermediate storage depots or "reception centers" is no more than 23 1/2 kilometers. The Sickle and Hammer Kolkhoz was 38 kilometers from its processing plant but had a "reception center" at 20 kilometers; the Gindeshtsky plant (Moldavia) had a 33 kilometer maximum; and the Ust Labinsk (Krasnodar) maximum was 30 kilometers, with an average distance of 15-18 kilometers from the sugar farms it serviced.

The team observed the packaging of sugar into 50-kilogram burlap bags, at the Salivonkovsk plant. Storage is in silos with capacity of 12,000-15,000 metric tons each. Liquid sugar is stored in special bulk storage plants. About 40 percent of the sugar supply goes into industrial uses, and the percentage is rising. A plant to process glucose from corn is being built in Moldavia, with output aimed at food and medicine applications. The capacity of the plant was not disclosed.

Expansion of plant and equipment is based on funds generated in several ways. At the Salivonkovsk plant, funds were internally generated; buildings are amortized over a 15-year period, and equipment over a 6-year period. At the Ministry of Food Industry in Moldavia, the financing of processing plants was said to be a "State Capital Investment"; depreciation is at 6 percent a year and the investment is fully paid off within 15 years. There was discussion among the Russians about whether interest was charged, which was concluded in an uncertain affirmation that "maybe 1 or 2 percent" interest was levied.

Procurement and Extraction Rates

USSR sugar beet procurement as a percent of estimated production appears to have been decreasing over the last 20 years from an average 94 percent in 1956-60 to 89 percent in 1971-75. Processed tonnage has decreased from about 90 percent to 85 percent in the same period, according to USDA estimates. Neither of these trends was confirmed by Soviet officials who insisted that there were year-to-year variations, but no downward trend. The suggestion that mechanization might have raised the dirt content of harvested sugar beet tonnage, or damaged the beets with the result of lowering processed quantities, was denied, except at Kiev.

There did not seem to be consistency between the areas in regard to procedures for estimating production, procurement, and processed quantities. At the Ministry of Agriculture in Moscow the team was informed that "spoiled" beets (i.e. damaged beets with low sucrose content) were not delivered but kept on farms, and that these beets, along with dirt, constituted the difference between production and procurement tonnages.

At the Kubanj Kolkhoz (Krasnodar), we were told that leaving beets on farms was not done because it was unprofitable, exept in kolkhozes with swine production. In Voronezh, we were told that for livestock it was not economical to use sugar beets; rather, fodder beets were used for that purpose. In Moldavia, the Ministry of Agriculture stated that sugar beets were rarely left in the fields, and then only in small quantities; the production weight is estimated at delivery of the beets to the processing plant.

At Labinsky sovkhoz (Krasnodar), the team obtained a seemingly authoritative version of the procedure used to report production: preliminary estimates of gross output were based on planted area; 95-98 percent of production was delivered and weighed, and a dirt factor was deducted to get procurement weight; the 2-5 percent left on the farms was also weighed, as total production formed the basis of payment to the workers. (However, sugar beets that were not dug up, for any reason, were not included in the production estimate). At the all-Union Scientific Research Institute for sugar beet growing (Kiev), the difference between production and procurement was said to be mostly dirt (5-10 percent depending on zone); the difference between procurement and processed weight was the result of losses in transportation and other factors (presumably spoilage); every load delivered to the receiving station or processing plant was sampled for sucrose content.

At the Gindeshtsky plant (Moldavia) and in the Kubanj plant (Krasnodar), every 10th truckload was sampled for sucrose content. Sucrose content varied from an average of about 18 percent in Moldavia to about 13-14 percent in Krasnodar Krai.

Kubanj Kolkhoz (Krasnodar) had its worst year in 1977 for sucrose content, about 12 percent

[1] Warren Hultquist has expressed an opposite observation in Soviet Sugar Beet Production: Some Geographical Aspects of Agro-Industrial Coordination in J.F. Karcz, *Soviet and East European Agriculture* (Berkeley: University of California Press, 1967), pp. 135-155.

compared with 14.5 percent in 1976, because of less favorable growing weather rather than because of any disease problems. Sucrose content in Krasnodar is always lower than in the Ukraine—perhaps because of soil conditions and variety of beets, according to the Kubanj's chairman. At Ust Labinsk (Krasnodar), sucrose content was said to be lower than in Central Russia "maybe because of higher temperatures;" however, beet yields were "the highest of any USSR region".

The Ministry of Agriculture, Moscow, estimated overall Soviet beet sucrose content in 1977 at about 16.5 percent, somewhat below that of 1976 because of cold spring weather. However, 16 days later upon our ruturn to Moscow, the Ministry of Food Industry (MFI) pointed out that 1977 sucrose content was "good," about the same as the previous 5-year average and definitely above that of 1976; the exact percentage would not be known until November.

The Ministry of Food Industry admitted that starting the harvest earlier in 1977 meant a tendency towards somewhat lower sucrose content; also, the extraction rate (the percent of refined sugar derived from the quantity of beets processed) would be slightly lower because there had been "rainy weather." In the Ukraine there had been record rainfall and not enough sunlight—though more heat and sun than in 1976—and so sucrose content was "not too high." The 1977 harvest was conducted in good weather, however, unlike that of 1976.

USSR Sugar Trade

The USSR's 10th Five-Year Plan indicates a narrowing of the gap between production and consumption, to near selfsufficiency by 1980. This was confirmed in discussions with Prodintorg. The Soviets apparently intend to continue importing 2-3 million tons of raw sugar from Cuba (their trade agreement, the team was told, "will continue for 20 years"), and the USSR will remain a net importer; however, the USSR will at the same time export (i.e. re-export) substantial quantities of sugar.

Through 1971, the USSR annually exported 1-1.5 million tons. Although after 1971 the USSR diversified its import sources of sugar from almost total reliance on Cuba, there is no long- term plan to further diversify because the USSR intends to meet its sugar needs mostly from domestic production. The question of extent of USSR aid to the Cuban sugar industry was not answered; this subject was said to be outside Prodintorg's scope.

Commenting on the recently concluded International Sugar Agreement, the Soviet official said that it was "very complicated. . . but should stabilize prices," and that the United States contributed a great deal to the Agreement "because you have to regulate your domestic prices."

For the first 2 years, the Sugar Agreement does not appear to pose problems for the USSR: as an importer, the USSR is presently in a good situation; and over the next 2 years, the USSR would be allowed exports of 500,000 tons per year to the free market. (USSR exports in 1974-76 averaged about 85,000 tons).

On trade data for 1977, the team was referred to the International Sugar Organization *Statistical Bulletin;* USSR data are submitted each quarter. Data on refined sugar production are obtained every 10 days, but these are preliminary and "only for our guidance." As of October 10, 1977 (from season's start September 1), the quantity of beet sugar refined had reached 2.3 million tons compared with 1.6 million tons for the same period in 1976. The campaign was exceeding the Plan by about 3.5 percent.

Sugar Beet Seed Production

Sugar beet seed production is much more difficult in the Soviet Union than in the United States. Because of the cold climate, most of the seed is produced by the steckling method. This involves planting the seed crop in March or April. The roots or stecklings are lifted in the fall and stored over winter in trenches. The stecklings are transplanted the following spring for seed production. Losses are severe and labor requirements are heavy.

A small portion of the seed crop is grown by the overwintering method in the North Caucasus and Kirghiz regions. This involves planting seed in July, overwintering in the field without lifting, and trench storage. The method is not too dependable in the North Caucasus region because the overwintered beets are frequently severely damaged by freezing. Extremely large areas (about 90,000 hectares) must be devoted to seed production.

Sugar Beet Research

Research is conducted on a large scale and is coordinated through the All Union Institute of Sugar Beet Research at Kiev. More than 1,100 workers are employed in sugar beet research throughout the Soviet Union. Most institutes emphasize research on plant breeding, agronomic practices, crop protection, physiology, engineering, seed production, and economics.

Considerable effort is being made to develop more productive monogerm varieties with a high sucrose concentration. The present varieties are either open-pollinated diploid or polyploid. Hybrid varieties

utilizing cytoplasmic male sterility are under development but none is in commercial use. Some effort is being put into disease resistance. Varieties with partial resistance to Cercospora leaf spot, powdery mildew, and storage rot are available.

Current Production Situation and Prospects to 1980

The 1977/78 Situation

USDA estimated 1977/78 USSR beet sugar production at 8.5 million tons (refined), or 9.3 million tons on a raw basis. Area in sugar beets, 3,754 million hectares, closely approximates the 1976/77 season's 3.76 million hectares. Sugar beets harvested will probably amount to 95 million tons, almost at the plan figure of 95.6 million tons. Last season's production of 98.6 million tons was higher, but contained more dirt and waste, as a result of rains and frost at harvest time. Consequently, despite the greater production, 1976 procurement was only 85 million tons compared with 88 million estimated for 1977. (It is the practice in the USSR to count—for transportation purposes—the total delivered weight as total production.)

Processed sugar beet tonnage should be no less than 85 million tons in 1977/78, as spoilage and waste should be no more than 3 percent of procurement weight. By comparison, the 1976/77 processed tonnage was only 80 million, or some 6 percent less than procurement weight.

With better quality beets this season, the extraction rate can be conservatively estimated at 10 percent, so that beet sugar output of about 8.5 million tons refined, or 9.3 million tons raw-value equivalent, is foreseen. This would be about 26 percent more than last seasons output and the highest in 5 years, although still below the record 9.57 million tons (refined basis) posted in 1967/68.

The 1978 goal for sugar beet production is 96.2 million tons, which was only exceeded in 1976. The 1978 goal will probably not be reached unless weather is unusually favorable in the major growing regions.

In the collective farms visited, the 1977 season appeared good, but not uniformly excellent. At the Sickle and Hammer farm (Voronezh, RSFSR) the harvest had already been completed when the team visited October 14. Production exceeded Plan, but was less than in 1976 because of lack of moisture in the growing season. Procurement was 17,000-18,000 tons compared with 18,000 in 1976. At Tschors (Ukraine), where harvest was to be completed October 27, sugar beet production was estimated at 32,000 tons, about 18 percent above Plan.

For the Ukraine as a whole, production was being estimated at 54-55 million tons compared with the Plan figure of 54 million. (However, production was close to 60 million in 1976.) Procurement for the Ukraine in 1977 was predicted to reach some 50 million tons, approximately 1 million above Plan. Moldavia's production was expected to be less than 1976's 3.5 million tons; about 85 percent of the harvest was in by October 20, and completion was expected by November 10. A frost had hit Moldavia September 28, affecting crops (and extensively damaging tobacco and grape fields). At the Kubanj collective (Krasnodar), the sugar beet harvest had just been completed when the team arrived October 25, and production was said to be above the previous year's; the Plan would be overfulfilled by at least 15 percent.

Prospects to 1980

The 10th Five-Year Plan (1976-80) has set a goal of sugar beet production averaging 95-98 million tons over the 5-year period; given 1976 and 1977 performance (98.6 million and an estimated 95 million tons) the goal seems achievable. However, production data have a highly variable "dirt factor" and are a less reliable indicator of refined sugar production potential than procurement tonnages.

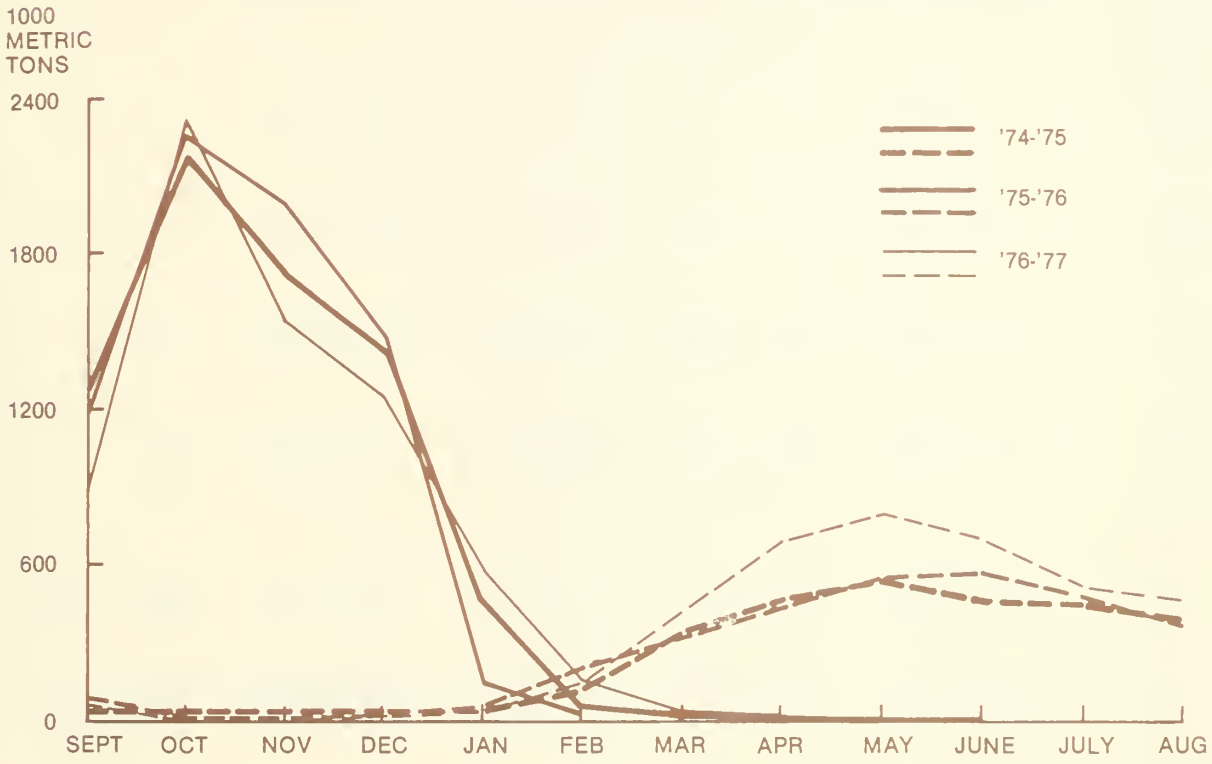
The Plan's procurement target requires a greater leap forward. The goal of 89.5 million tons averaged over 1976-80 means a growth of 32 percent above the 1971-75 Five-Year Plan average. Yet, compared with 1966-70, the target represents about 20 percent growth, which appears reasonable. With State procurement at 85 million tons in 1976 and about 88 million in 1977, some 91.5 million tons annually will be required over the next 3 years in order to achieve the Plan goal.

Refined sugar production has been targeted at 11.2 million tons by 1980. This would be almost 50 percent higher than the poor 1971-75 average and about 30 percent above the 1961-65 average. A gain of this magnitude is ambitious yet not unprecedented, as refined beet sugar output rose 37 percent between 1956-60 and 1961-65. Furthermore, the 11.2 million tons would be merely 17 percent above the record 9.57 million tons registered a decade ago.

The USSR's sugar beet and sugar goals appear realizable given greater Soviet emphasis in a number of areas:

- Irrigated area (slated to increase at least 15 percent);
- Research to raise sucrose content, sugar beet yields, and increase disease resistance;
- Use of less mineral fertilizers;
- Better harvesting techniques;
- Expanding mill processing capacity and raising mill efficiency (including the possibility of reprocessing molasses to augment refined sugar output).

USSR: REFINED SUGAR PRODUCTION FROM DOMESTIC BEETS AND IMPORTED RAW CANE - MONTHLY 1974/75 - 1976/1977



NOTE: SOLID LINES REPRESENT BEET PROCESSING AND
BROKEN LINES REPRESENT RAW CANE PROCESSING

Table 1—USSR: Sugar beet area, yield, production, state procurement, processed quantity, and beet sugar production, 5-year averages 1956/57-1975/76, and annual 1956/57-1977/78

Item	Sugar beet					Refined beet sugar output	Raw sugar equivalent	Procurement to production	Processed to procurement	Extraction rate[1]
	Area	Yield	Production	Procurement	Processed					
	1,000 hectares	*Metric tons per hectare*	*1,000 metric tons*					*Percent*		
6th Five-Year Plan:										
1956/57	2,009	16.2	32,488	31,457	30,391	3,849	4,184	97	97	12.66
1957/58	2,109	18.8	39,672	38,535	36,909	4,800	5,217	97	96	12.93
1958/59	2,497	21.8	54,392	51,023	48,597	5,700	6,196	94	95	11.73
1959/60	2,754	15.9	43,942	41,369	40,185	5,186	5,637	94	97	12.86
1960/61	3,040	19.1	57,728	52,198	48,776	5,414	5,885	90	93	11.21
Average	2,482	18.4	45,644	42,916	40,972	4,990	5,424	94	95	12.18
7th Five-Year Plan:										
1961/62	3,121	16.4	50,911	47,742	45,400	5,831	6,338	94	95	12.84
1962/63	3,170	15.0	47,435	43,946	42,432	5,606	6,093	93	97	13.21
1963/64	3,750	11.8	44,052	41,455	39,237	5,279	5,738	94	95	13.45
1964/65	4,110	19.9	81,174	76,124	72,565	9,484	10,309	94	95	13.07
1965/66	3,882	18.8	72,276	67,500	64,261	7,948	8,637	93	95	12.37
Average	3,607	16.4	59,170	55,353	52,797	6,830	7,424	94	95	12.94
8th Five-Year Plan:										
1966/67	3,803	19.5	74,037	69,715	65,487	7,827	8,508	94	94	11.95
1967/68	3,797	23.0	87,111	81,579	76,538	9,571	10,403	94	94	12.50
1968/69	3,560	26.6	94,340	84,168	82,075	9,144	9,931	89	98	11.14
1969/70	3,384	21.1	71,158	65,283	61,309	7,998	8,693	92	94	13.05
1970/71	3,368	23.7	78,942	71,385	68,188	8,276	8,976	90	96	12.14
Average	3,582	22.8	81,118	74,426	70,719	8,563	9,308	92	95	12.16
9th Five-Year Plan:										
1971/72	3,321	21.9	72,185	64,329	62,184	7,404	8,048	89	97	11.91
1972/73	3,486	22.3	76,424	68,043	65,372	7,429	8,075	89	96	11.36
1973/74	3,553	24.7	87,047	77,799	75,337	8,770	9,533	89	97	11.64
1974/75	3,610	21.6	77,948	67,484	64,005	7,112	7,730	87	95	11.11
1975/76	3,666	18.1	66,314	61,880	59,101	7,086	7,702	93	96	11.99
Average	3,527	21.7	75,984	67,907	65,200	7,560	8,217	89	96	11.60
10th Five-Year Plan:										
1976/77	3,760	26.3	98,605	85,000	80,000	6,761	7,350	86	88-94	9.01-9.19
1977/78	3,754	25.3	95,000	88,000	85,000	8,500	9,239	93	97	10.00
1978/79	—	—	—	—	—	—	—	—	—	—
1979/80	—	—	—	—	—	—	—	—	—	—
1980/81[2]	—	—	97-103,000	91,300	—	11,200	12,174	—	—	12.6
Average	—	—	95- 98,000	89,500	—	—	—	—	—	—

[1] Refined sugar as a percent of processed weight. [2] USDA-ESCS-FDCD estimate based on reported targets.

SOURCE: USDA-ERS, *The Agricultural Situation in the Soviet Union* (April 1977 and April 1975 issues); USDA-ERS, *Agricultural Statistics of Eastern Europe and the Soviet Union* 1950-70 (June 1973; and USDA-ESCS, FDCD estimates and unpublished data based on Soviet sources.

Table 2—USSR: Refined sugar production from domestic beets and imported raw cane, monthly and cumulative, 1974/75-1977/78

(In 1,000 metric tons)

Season	September	October	November	December	January	February	March	April	May	June	July	August
1974/75												
Beet sugar:												
Monthly	1,264	2,167	1,730	1,419	469	58	4	0	1	0	0	0
Cumulative . .	1,264	3,431	5,161	6,580	7,049	7,107	7,111	0	7,112	7,112	7,112	7,112
Cane sugar:												
Monthly	55	44	46	48	31	119	330	462	537	474	447	387
Cumulative . .	55	99	145	193	224	343	673	1,135	1,672	2,146	2,593	2,980
All sugar:												
Monthly	1,319	2,211	1,776	1,467	500	177	334	462	538	474	447	387
Cumulative	1,319	3,530	5,306	6,773	7,273	7,450	7,784	8,246	8,784	9,258	9,705	10,092
1975/76												
Beet sugar:												
Monthly	1,181	2,267	1,986	1,478	160	14	0	0	0	0	0	0
Cumulative . .	1,181	3,448	5,434	6,912	7,072	7,086	7,086	7,086	7,086	7,086	7,086	7,086
Cane sugar:												
Monthly	77	1	21	51	57	196	316	430	542	590	485	372
Cumulative . .	77	78	99	150	207	403	719	1,149	1,691	2,281	2,766	3,138
All sugar:												
Monthly	1,258	2,268	2,007	1,529	217	210	316	430	542	590	485	372
Cumulative . .	1,258	3,526	5,533	7,062	7,279	7,489	7,805	8,235	8,777	9,367	9,852	10,224
1976/77												
Beet sugar:												
Monthly	883	2,307	1,546	1,252	569	163	30	6	4	1	0	0
Cumulative . .	883	3,190	4,736	5,988	6,557	6,720	6,750	6,756	6,760	6,761	6,761	6,761
Cane sugar:												
Monthly	64	0	15	18	12	137	421	692	787	705	516	462
Cumulative . .	64	64	79	97	109	246	667	1,359	2,146	2,851	3,367	3,829
All sugar:												
Monthly	947	2,307	1,561	1,270	581	300	451	698	791	706	516	462
Cumulative . .	947	3,254	4,815	6,085	6,666	6,966	7,417	8,115	8,906	9,612	10,128	10,590
1977/78												
Beet sugar:												
Monthly	1,523	2,386	1,928	1,564								
Cumulative . .	1,523	3,909	5,837	7,401								
Cane sugar:												
Monthly	68	9	29	32								
Cumulative . .	68	77	106	138								
All sugar:												
Monthly	1,591	2,395	1,957	1,596								
Cumulative . .	1,591	3,986	5,943	7,539								

Source: USDA-ERS, *The Agricultural Situation in the Soviet Union* (April 1977).

Table 3—USSR: Per capita consumption of sugar, 5-year averages 1966-75, and annual 1950, 1960, and 1970-77

Year	Per capita consumption in kilograms
1950	11.6
1960	28.0
1970	38.8
Average, 1966-70	37.2
1971	39.5
1972	38.8
1973	40.8
1974	41.0
1975	40.8
Average, 1971-75	40.2
1976	[1] 41
1977	[2] 41.8
1978	—
1979	—
1980 Plan	43.0

[1] USDA-ERS-FDCD estimate.
[2] USSR, Ministry of Food Industry, 27 October 1977.

Table 4—USSR: Production of sugar, by type, annual 1956-77

(In 1,000 Metric tons)

Item	Total	Refined beet sugar	Refined cane sugar
1956	4,354	4,158	196
1957	4,491	4,205	286
1958	5,433	5,246	187
1959	6,011	5,993	18
1960	6,363	5,266	1,097
Average	5,330	4,974	357
1961	8,376	6,085	2,291
1962	7,800	5,983	1,817
1963	6,219	5,531	688
1964	8,208	7,032	1,176
1965	11,037	8,924	2,113
Average	8,328	6,711	1,617
1966	9,740	8,295	1,445
1967	9,939	8,453	1,486
1968	10,766	9,030	1,736
1969	10,347	9,272	1,075
1970	10,221	8,139	2,082
Average	10,203	8,638	1,565
1971	9,025	7,805	1,220
1972	8,908	7,307	1,596
1973	10,714	8,449	2,265
1974	9,446	7,848	1,598
1975	10,381	7,444	2,937
Average	9,695	7,771	1,923
1976	9,247	6,162	3,085
1977	—	—	—
1978	—	—	—
1979	—	—	—
1980	—	—	—
Average			

SOURCE: USDA-ESCS-FDCD.

Table 5–USSR: Sugar beet area, yield, production, and state procurement by republics, 5-year averages 1961-75

Item	Area[1]			Yield[2]			Production			State Procurement		
	1961-65	1966-70	1971-75	1961-65	1966-70	1971-75	1961-65	1966-70	1971-75	1961-65	1966-70	1971-75
	1,000 hectares			*Centner per hectare*			*1,000 metric tons*					
USSR	3,607	3,582	3,527	165	228	217	59,170	81,118	75,984	55,353	74,426	67,907
RSFSR[3]	1,564	1,484	1,484	119	172	142	18,615	25,520	20,812	17,073	23,298	18,632
Ukraine SSR . . .	1,724	1,750	1,716	198	267	268	34,131	46,731	45,957	32,194	42,850	40,785
Belorussia SSR. .	45	49	50	136	214	225	618	1,039	1,107	550	949	1,000
Kazakhstan SSR.	63	68	76	236	333	290	1,492	2,276	2,195	1,429	2,169	2,086
Georgia SSR . . .	5	4	3	230	345	380	112	138	132	111	137	129
Lithuania SSR . .	37	28	34	125	222	235	460	625	804	432	575	693
Moldavia SSR . .	88	100	102	207	257	279	1,821	2,567	2,836	1,745	2,380	2,590
Latvia SSR	22	16	10	125	205	268	274	331	253	256	298	211
Kirghiz SSR . . .	46	52	47	335	342	374	1,543	1,781	1,768	1,461	1,663	1,664
Armenia SSR . .	4	4	4	260	250	270	104	110	120	102	107	117

[1] For 1961-65 and 1966-70, republic data are derived from production and yield and are only approximately correct.
[2] USSR yields are typically given in centners, equal to 100 kilograms, per hectare.
[3] Russian Soviet Federated Socialist Republic.

SOURCE: *Narodnoye Khozyaistvo SSSR za 60 let: Yubileiny Statisticteskiy Ezhegodnik* (Moscow: Statistika, 1977).

Table 6—USSR: Sugar beet area, yield, and production, by economic regions, in the Russian Soviet Federated Socialist Republic and Ukraine republic, 1965, 1970, and average 1971-75

Country	Area			Yield			Production		
	1965	1970	1971-75	1965	1970	1971-75	1965	1970	1971-75
	1,000 hectares			*Centners per hectare*			*1,000 metric tons*		
Russian Soviet Federated Socialist Republic (RSFSR)	1,669	1,398	1,484	126	175	140	20,655	23,903	20,812
Central	175	144	154	91	139	101	1,544	1,903	1,561
Volga-Vyatsk	36	28	33	71	102	128	245	284	422
Central Black Soil	830	722	767	134	171	137	11,000	12,224	10,471
Volga	221	203	212	80	137	113	1,683	2,634	2,397
North Caucasus	316	249	260	169	252	231	5,318	6,193	6,001
West Siberia	72	52	58	100	128	97	719	665	560
Ukraine Republic	1,863	1,659	1,716	235	280	268	43,793	46,309	45,957
Donets-Dneprovskii	–	545	669	–	245	153	–	13,293	10,267
South West	–	1,022	1,058	–	298	299	–	30,377	31,628
South	–	92	99	–	287	208	–	2,639	2,062

SOURCE: *Narodnoye Khozyaistvo SSR* 1976 (Moscow: Statistika, 1977), and 1975 edition; *Narodne Gospodarstvo Ukrainskoy* SR 1975 (Kiev: Tekinika, 1976); *Narodnoye Khozaistvo RSFSR* 1975 (Moscow: Statistika, 1976).

Table 7—USSR: Sugar imports and exports, selected countries, annual 1955, 1960, 1965, 1970-77

[In 1,000 metric tons, raw value]

	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976[1]	1977[1]
Imports from:											
Australia	–	–	–	–	–	120	76	–	51	–	–
Brazil	9	–	–	–	–	300	458	–	95	–	–
China, P. R.	–	–	37	–	–	–	–	–	–	–	–
Colombia	–	–	–	–	–	10	61	–	–	–	–
Cuba	462	1,468	2,253	3,003	1,536	1,101	1,603	1,856	2,964	3,067	3,500
Czechoslovakia	111	128	–	–	–	22	22	–	1	31	–
Dominican Republic	–	–	–	–	–	23	100	–	–	–	–
France	50	–	–	–	–	54	–	–	–	267	–
German D. R.	9	–	–	–	–	82	–	–	–	18	–
Hungary	31	–	2	1	–	–	–	–	–	–	–
Mexico	27	–	–	–	–	–	–	–	–	–	–
Peru	–	–	–	–	–	–	97	–	105	–	–
Philippines	–	–	–	–	–	–	–	–	–	224	600
Poland	231	110	2	1	–	109	109	–	–	115	–
United Kingdom	53	–	–	–	–	–	–	–	–	30	–
Other	14	11	–	–	–	103	105	–	21	8	200
Total	997	1,717	2,293	3,005	1,536	1,924	2,631	1,856	3,237	3,760	4,300
Exports to:											
Afghanistan	10	33	58	54	45	18	11	54	22	20	–
Algeria	–	–	15	52	117	–	–	–	–	–	–
Bulgaria	–	–	–	161	94	–	–	–	–	–	–
United Kingdom	–	–	–	108	86	–	–	–	–	–	–
Egypt	–	–	–	11	10	–	–	–	–	–	–
Finland	123	108	133	139	136	–	–	30	–	–	–
German D. R.	–	–	–	161	75	–	–	–	–	–	–
Ghana	–	5	27	39	17	–	–	–	–	–	–
Hungary	–	–	–	12	76	–	–	–	–	–	–
Indonesia	–	–	–	24	82	–	–	–	–	–	–
Iran	79	52	84	59	66	6	–	–	–	–	–
Iraq	–	12	–	177	168	–	–	–	–	–	–
Jordan	–	–	11	35	48	–	–	–	–	–	–
Korea N.	1	–	–	33	13	5	–	–	–	–	–
Kuwait	–	–	22	11	11	–	–	–	–	–	–
Lebanon	–	–	2	24	30	–	–	–	–	–	–
Libya	–	–	34	69	–	–	–	–	–	–	–
Mali	–	–	13	22	7	–	–	–	2	–	–
Mongolia	6	2	19	18	20	23	24	19	25	19	–
Nigeria	–	–	4	28	38	–	–	–	–	–	–
Pakistan	–	–	32	–	–	–	–	–	–	–	–
Saudi Arabia	–	–	20	31	11	–	–	–	–	–	–
Sierra Leone	–	–	1	6	4	–	–	–	–	–	–
Somalia	–	–	7	–	7	–	–	–	–	–	–
South Yemen Rep.	–	–	10	11	13	–	–	–	–	–	–
Sri Lanka	–	–	33	33	46	–	–	–	–	–	–
Sudan	–	29	76	88	72	–	–	–	–	–	–
Sweden	–	–	15	12	31	–	–	–	–	–	–
Vietnam N.	–	–	–	1	16	11	11	9	9	11	–
Yemen	–	11	50	49	41	–	–	5	· 2	2	–
Yugoslavia	–	–	10	12	–	–	–	–	–	–	–
Other	9	10	55	37	22	1	–	–	–	27	–
Total	228	262	731	1,517	1,402	64	46	117	59	79	–

Note: Individual items may not add to totals because of rounding.

[1] Preliminary.

SOURCE: International Sugar Organization *Yearbooks* 1975, 1969, 1966, 1960; and ISO, *Statistical Bulletin*, August 1977.

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